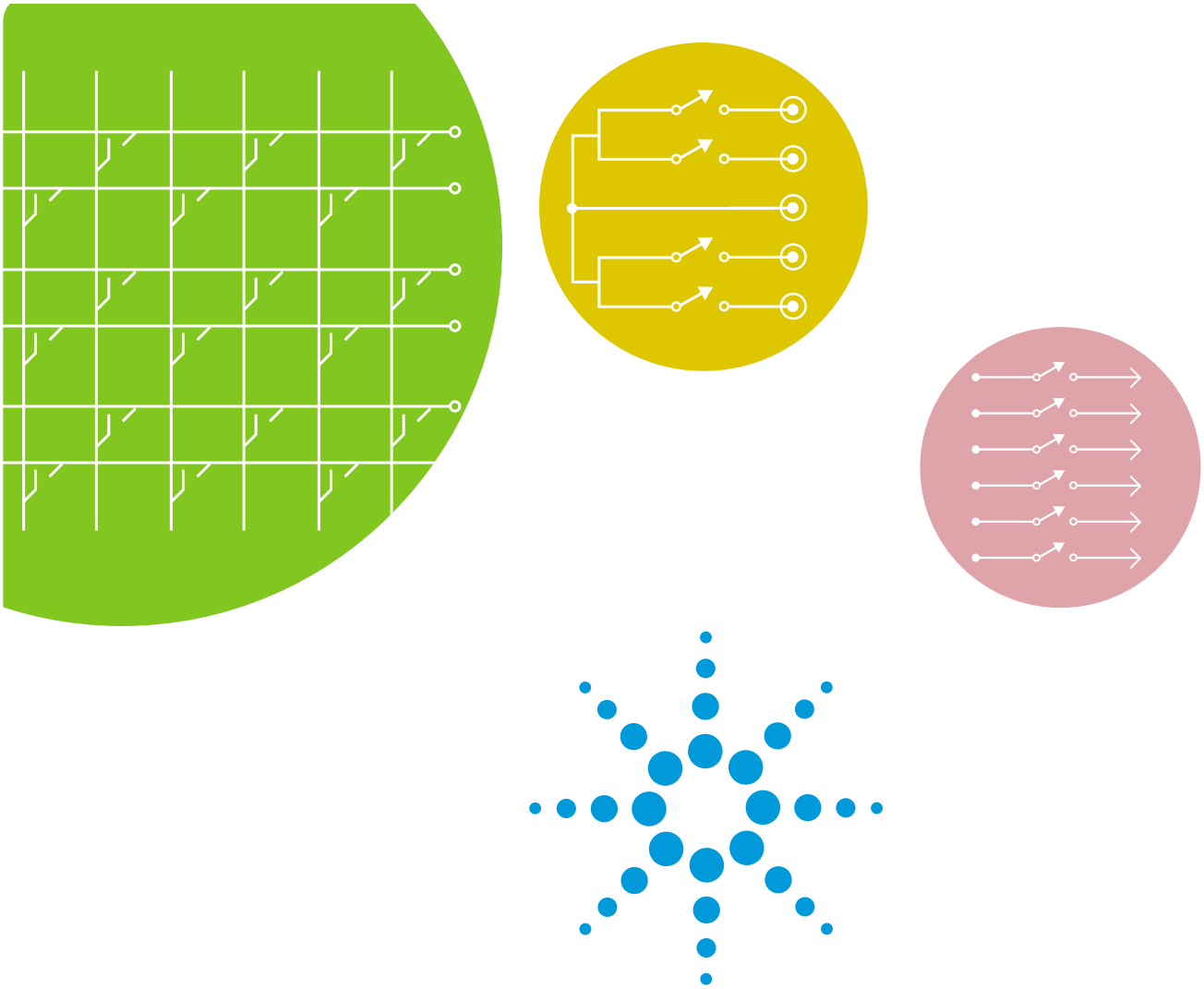


Defining the
Meaning of Quality in ATE

Agilent Technologies
3499 Switch/Control System

Product Overview

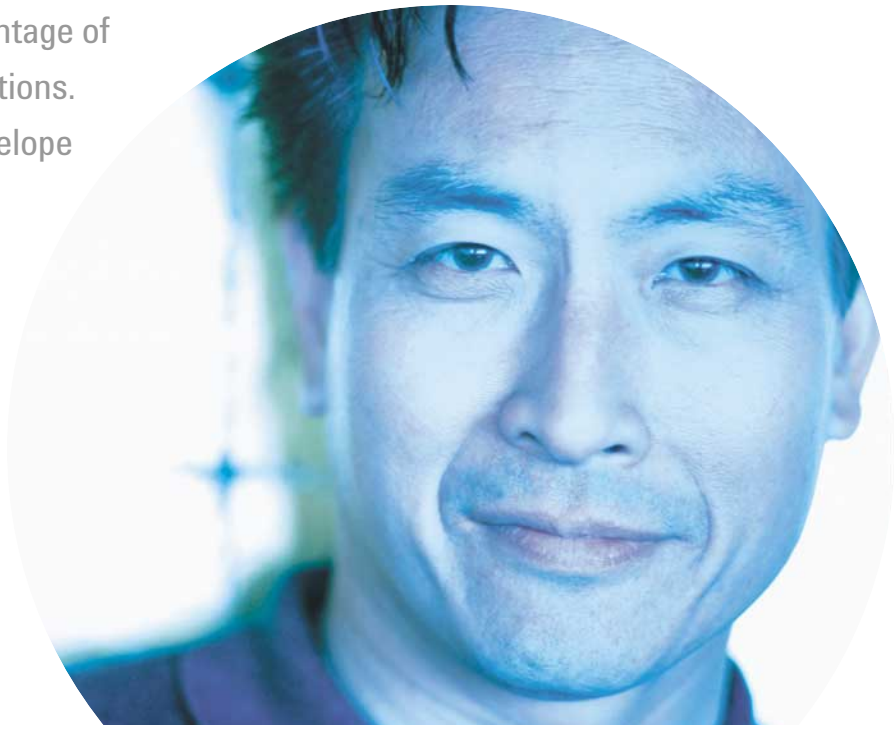
Agilent Technologies

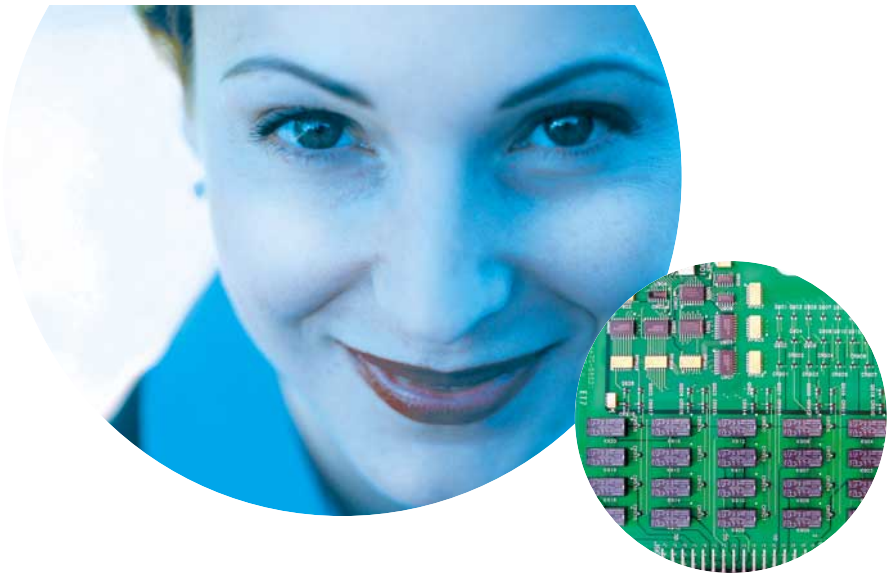
At Agilent, we continuously strive for the highest quality in our products.

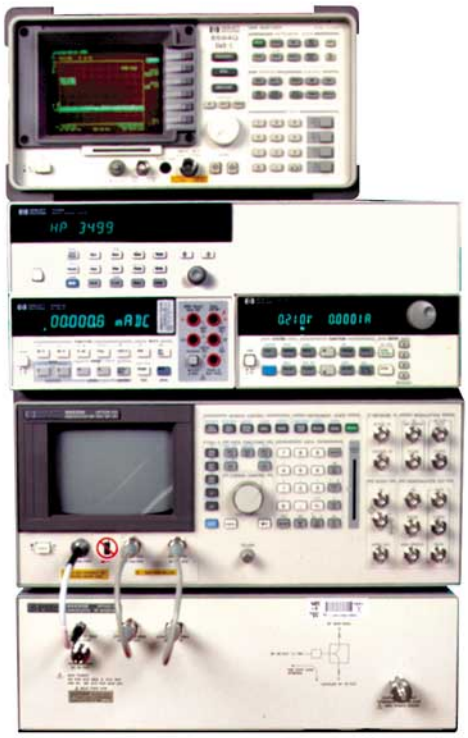
So you can do the same with yours.

High Quality, Low Impact, Easy Decision

The Agilent 3499 switch/control system is designed for high quality signal switching in your automated test equipment (ATE) applications. There's no compromise in signal integrity when you leverage your test equipment with the 3499 switching topology. Its high-speed architecture and high-density switching capabilities will keep your test throughput to a maximum. And its low price and compact design means you get this great performance with minimal impact on your budget and operating environment. That's a primary advantage of coming to Agilent for your ATE solutions. We constantly push the quality envelope in our designs. So you can always have assurance about the quality of your products.







The Agilent 3499 family defines the standard for quality in switch/control solutions worldwide. And you get a powerful architecture, compact design, and low price.

The "Right Test"

Wide range of different modules means you can get the precise test solution you need: no more no less.

High Throughput, Small Footprint

You can increase test throughput and equipment utilization without adding floor space to your manufacturing area.

Smart Design

Multi-function modules that integrate switching and digital I/O allow you to make best use of all available resources.

Easy Set-Up

Easy wiring simplifies cabling and increases reliability. Simple, robust interconnections accelerate system set-up and module swapping.

Simple Maintenance

Built-in relay cycle counters help make sure maintenance happens on schedule, as expected.

High speed, high density, highly usable.

The Agilent 3499 gets high marks in ATE environments worldwide.

Performance Overview

There are three modular mainframes in the 3499 family:

- 3499B - two-slots, up to 80 channels
- 3499A - five-slots, up to 200 channels
- 3499C – 9/14 slots, up to 360 channels

The 3499C can accommodate up to nine plug-in modules that can occupy up to fourteen physical slots, thus providing a cost efficient configuration for modules that are one, two or three slots wide. All mainframe configurations of the Agilent can scan at rates up to 350 channels per second, or open/close 200 channels in less than 0.1 second.

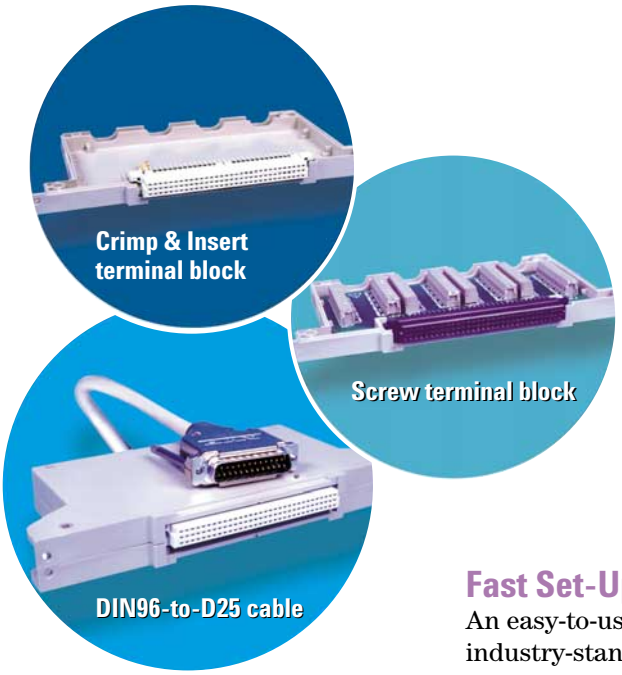
You can choose from different plug-in modules to switch:

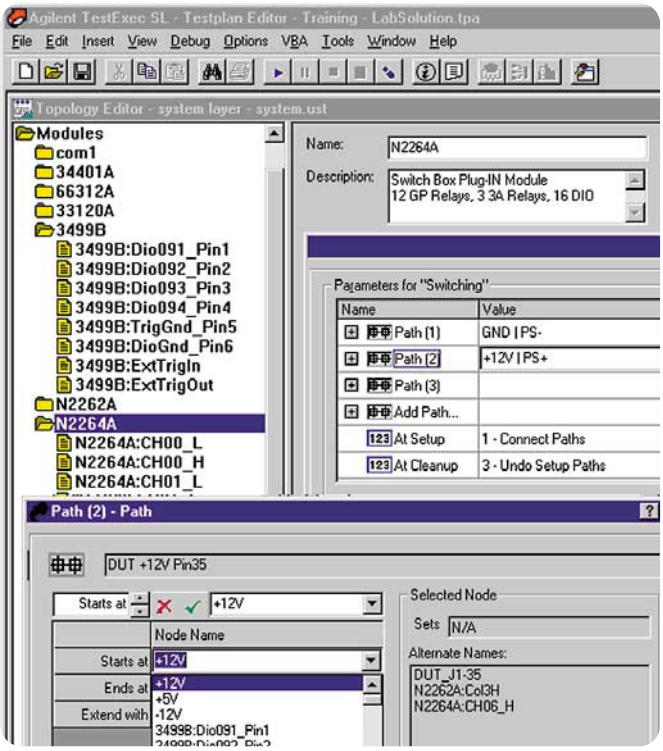
- electronic signals from DC to 20 GHz,
- voltages to 1,000 V, or currents to 8 A
- optical signals from 1270 to 1670 nm

All units have an efficient user interface that works equally well on the manufacturing floor and in desktop applications. High-performance switching modules, multifunction modules, built-in relay cycle counters and straightforward connections all contribute to the performance and day-to-day usability of the 3499. Here's what it means in the real world...

Improved Throughput

While traditional switching mainframes open/close relays in sequence, the Agilent 3499A/B/C systems use innovative parallel driving circuits to open/close switches simultaneously, significantly increasing test throughput. These systems also provide high-density modules with up to 40 channels per module. Three multi-function modules integrate switching, digital I/O, and DAC's in one module to enhance system performance.





Total Flexibility

The 3499A, B, and C mainframes accommodate a full range of modules, including multiplexers, fiber-optical multiplexers, general-purpose relays, matrices, digital I/O, VHF modules, RF modules, microwave modules, Form-C relays, and multifunction modules. By combining these mainframes and modules, a test system can be set up with fewer modules in less space, and the cost and complexity of the system can be reduced.

Fast Set-Up

An easy-to-use interface and industry-standard connections mean fast set-up and integration with the 3499. Usability features include:

- Standard RS-232 and GPIB interfaces
- SCPI (Standard Commands for Programmable Instruments)
- Simplified configuration procedures
- Self-guiding front panel interface
- Easy-to-use module connection accessories

Simplify control of switch modules with Agilent TestExec SL software (available separately). Operate switches using user-defined signal names rather than writing SCPI commands. TestExec SL includes example setups for the most popular 3499 modules.

Cost-Sensitive Test

With three mainframes and many modules to choose from, you can make sure the 3499 meets your exact needs. Build the system you need today, add more modules later as your needs change. That means you buy only the test capability you need. Newly designed high-density switch modules further reduce the cost-of-test by combining a large number of channels on a single module. And with up to 40 switching channels per module, the 3499 reduces per-channel cost while saving rack and floor space. You get a simpler system with fewer modules, reducing the cost of buying, owning and maintaining your system.

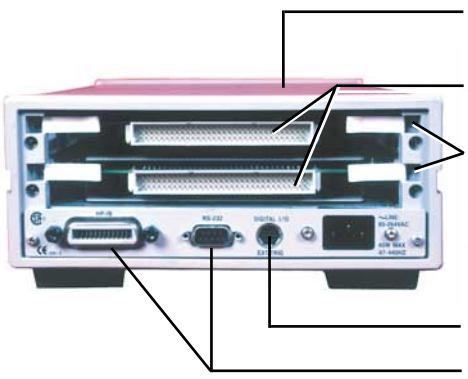
Multi-Function Flexibility

Two multifunction modules are supported with the 3499. The Agilent N2264A includes 12 general-purpose relay channels, three high-current general-purpose relay channels, and 16 bits of digital I/O. These high current channels are ideal for mobile phone test, battery test and UPS test where only two or three high-current channels are required. The N2265A combines a 4x4 matrix switch with 16 bits of digital I/O on one module.

Simple Wiring

The 3499 reduces wiring time with removable screw terminal blocks and crimp-and-insert terminal blocks that are detachable from the switching modules. This eliminates the need to spend time rewiring the connectors if a switching module is replaced. The seven high-density modules use industry standard DIN96 connectors for better flexibility. The modules are equipped with DIN96-to-D50(25) cables for easy connection to the DUT and test instruments. These cables completely eliminate wiring.

Easy-to-read display
Internal power supply to support parallel relay operation
Quick access to most-often-used functions
Intuitive self-guiding menu
Monitor display mode to make developing programs easier
Store/recall keys for easy/fast set-up


Compatible with all Agilent 3488A modules–protects your investment
28 plug-in modules to choose from for switching and control
2-slot Agilent 3499B mainframe offers up to 80 channels
5-slot Agilent 3499A mainframe offers up to 200 channels
9-slot Agilent 3499C mainframe offers up to 360 channels
Built-in digital I/O and external trigger link
Built-in GPIB and RS-232 interfaces

Minimum Downtime

The 3499 takes the guesswork out of relay maintenance. A built-in relay cycle counter automatically counts every individual relay closure and stores the values onboard in non-volatile memory. A simple command (DIAG: CYC? Chan. xx) recalls the total number of cycles completed for each individual relay. You can use the counter to accurately predict end-of-life relay failures, and perform preventive maintenance ahead of time, virtually eliminating unplanned downtime due to failed relays.

Easy Migration

The 3499 is hardware and software compatible with its predecessor, the 3488A. All 3488A modules will work in a 3499A/B/C mainframe with all combinations of N2260A-82A modules. The 3499A/B/C mainframes can be operated with SCPI (Standard Commands for Programmable Instruments) or the 3488A command sets. Upgrading from the 3488A to the 3499A or 3499C increases channel capacity and lowers your cost-per-channel with no additional cost in modules or software revisions.

The Agilent 3499 adapts to the needs of manufacturers in the real world.

Mobile Phone Test

A typical test system for mobile phones includes a switch system, a GSM/CDMA test set, a DMM (digital multimeter), a power supply, and a spectrum analyzer. An Agilent 3499A with just three modules provides a complete switching solution for this test system. The three general-purpose high-current relays in the N2264A multifunction module switch the mobile phone power supplies: main battery, backup battery, or charger. With the three relays on the N2264A, the DMM tests the sleeping, standby, and working current between 0.1 mA and about 4 A. Eight bits of digital I/O provided by the N2263A module drives the external solenoid coils to simulate key pressing. Eight additional bits of digital I/O are used to drive a coaxial relay to route the RF signal coming from the phone antenna to the GSM/CDMA test set (for camping, call set-up, power level, or biterror- rate test), or to a spectrum analyzer (for spectrum leakage tests). Three more bits of digital I/O are used to communicate with the mobile phone under test. Working with the DMM, the N2262A matrix module switches the voice signals to/from the mobile phone for audio testing.

3499A 5-Slot Mainframe	
N2262A Matrix Module	
N2263A Digital I/O Module	
N2264A Multifunction Module	
DMM	Power Supply
GSM/CDMA Test Set	
Spectrum Analyzer	

A typical mobile phone final test

Pager Test

A typical test system that tests a pager PC board consists of a 3499B equipped with one multiplexer module, one matrix module , one DMM, and one power supply. This compact test system can test one pager. In this configuration, one two-meter rack is capable of holding six to eight test systems. One N2262A matrix channel switches the DUT on and off. Using a N2260A multiplexer channel, the DMM tests the bias voltage of the mixer, front-end amplifier, and filters to ensure that the different circuits of the pager are working properly. Using another multiplexer channel, the DMM also tests the working/standby current to ensure that the pager's battery has adequate working life.

3499B 2-Slot Mainframe
N2260A Multiplexer Module
N2262A Matrix Module
DMM
Power Supply
Monitor

A typical pager board test system

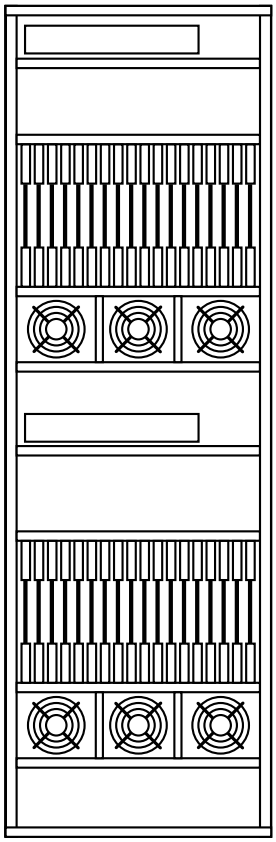
SDH Multiplexer Test System

Testing SDH multiplexers is a more complex task. A typical test system consists of a communication performance analyzer, a optical multi-meter, and a switch mainframe. The mainframe is equipped with two 1 x 8 optical multiplexers, a quad 1x2 optical multiplexer, four RF multiplexers, and a general purpose 1 x 20 multiplexer. This system can test eight SDH multiplexer modules in the same test in the final production test procedure. Test items include eye diagrams, BER, optical power level, optical signal crosstalk, 2MHz mask, jitter and APD sensitivity.

The typical test time lasts about 3-4 hours per module. In different test items, the optical signal from the Agilent 37718A analyzer must sequentially loop through eight different DUTs switched by the N2282A and N2280A optical multiplexers. The 44472A RF multiplexers are used to route the electronic synchronized signal or 10MHz clock signal. The 44470D general purpose multiplexer is used to switch the control signal to each SDH multiplexer module. All the signals including DC, RF, and optical can be switched in one Agilent 3499C mainframe, resulting in significant savings in rack space and system integration time. The test system can also be used for burn-in or aging test of optical transmission equipment working at 2.5Gb/s rate.

3499C 9-Slot Mainframe
Two N2282A One N2280A Four 44472A VHF Multiplexer One 44470D Multiplexer
37718A Communication Analyzer
8163A Optical Multimeter
8-slot DUT Test Closure
6030A, 48V/6A Power Supply

For more information, please view our Test System Switching application note online at **www.agilent.com/find/3499**



Typical SDH Multiplexer

Go Configure

Broad configuration flexibility using a wide choice of plug-in modules accounts for the wide adoption of the Agilent 3499 worldwide. The following tables make the point. The 3499 is built for the unpredictable, ever-shifting needs of ATE.

Agilent 3499 Mainframe Selection Table	
Slot Capacity	**3499A:** 5 slots **3499B:** 2 slots. **3499C:** 9 logical slots, 14 physical slots (six 1-slot, one 2-slot, two 3-slot)
Physical Size	**3499A:** 2U high, full rack wide **3499B:** 2U high, half-rack wide **3499C:** 5U high, full rack wide

Available plug-in modules include multiplexers, RF multiplexers, fiber-optical multiplexers, general-purpose relays, matrices, digital input/output, Form-C, breadboard and multifunction modules. Please refer to the following table for plug-in module selection.

Plug-in Module Selection Table

Module	Description	Max. Voltage	Max. Current per Chan.	Initial Closed Channel Resistance	Thermal Offset per Chan.	Bandwidth	Connection Type	Relay Cycle Counter
Multiplexer Modules								
N2260A	40-channel	200V	1A	<1 Ω	<3μV	10MHz	T or C	Yes
N2266A	40-channel	200V	0.5A	<1 Ω	<50μV	40MHz	T or C	Yes
N2270A	10-channel	1000V	1A	<1 Ω	<200μV	5 MHz	Crimp & Insert	Yes
44470A	10-channel	250V	2A	<1 Ω	<3μV	10MHz	T	
44470D	20-channel	250V	2A	<1 Ω	<3μV	10MHz	T	
General-purpose Relay Modules								
N2261A	40-channel	200V	1A	<0.5 Ω	<3μV	10MHz	T or C	Yes
N2267A	8-channel	250V	8A	<0.08 Ω	<3μV	20MHz	Crimp & Insert	Yes
44471A	10-channel	250V	2A	<1 Ω	<3μV	10MHz	T	
44471D	20-channel	250V	1A	<1 Ω	<3μV	10MHz	T	
44477A	7-channel	250V	2A	<1 Ω	<3μV	10MHz	T	
Matrix Modules								
N2262A	4 x 8 matrix	200V	1A	<1 Ω	<3μV	10MHz	T or C	Yes
44473A	4 x 4 matrix	250V	2A	<1 Ω	<3μV	10MHz	T	
Digital I/O Modules								
N2263A	32-bit TTL	42V	0.6A	NA	NA	NA	T or C	
44474 A	16-bit TTL	30V	0.125A	NA	NA	NA	T	
Multifunction Modules								
N2264A	12 GP	200V	1A	<0.5 Ω	<3μV	10MHz	T or C	Yes
	3 GP	125V	5A	<0.1 Ω	<3μV	10MHz	T or C	Yes
	16-bit DIO	42V	0.6A	NA	NA	NA	T or C	
N2265A	4 x 4 matrix	200V	1A	<1 Ω	<3μV	10MHz	T or C	Yes
	16-bit DIO	42V	0.6A	NA	NA	NA	T or C	

Note: GP = General-purpose, DIO = Digital I/O, T = Terminal Block, C = Cable.

Fiber-optical Multiplexer Modules (typical specs)

Modules	Description	Insertion loss	Stability	Repeatability	Wavelength	Connector	Switching Time	
N2280A	Quad 1 x 2	0.5 dB	± 0.03dB	± 0.005dB	1310/1550 nm	SC/APC	15 ms	
N2281A	Dual 1 x 4	0.5 dB	± 0.03dB	± 0.0065dB	1310/1550 nm	SC/APC	20 ms	
N2282A	Single 1 x 8	0.5 dB	± 0.02dB	± 0.005/0.01dB	1270/1670 nm	SC/APC	250 ms	

RF & Microwave Modules

Modules	Description	Insertion loss	Cross talk	SWR	Bandwidth	Impedance	Connector	
N2268A	Dual 1 x 4	<0.35dB	<-64dB	<1.20	3.5 GHz	50 Ω	SMA	
N2272A	Single 1 x 9	<0.5dB	<-75dB	<1.20	1.0 GHz	50 Ω	BNC	
N2276A	Dual 1 x 6	<0.36dB	<-100dB	<1.20	20 GHz	50 Ω	SMA	
N2276B	Relay driver can support 2 microwave switches. Technical specs depend on the mounted relays.							
44472A	Dual 1 x 4	<0.75dB	<-85dB	<1.12	300 MHz	50 Ω	BNC	
44478A	Dual 1 x 4	<1.1dB	<-70dB	<1.35	1.3 GHz	50 Ω	BNC	
44478B	Dual 1 x 4	<1.1dB	<-70dB	<1.35	1.3 GHz	75 Ω	BNC	
44476A	Triple 1 x 2	<0.25dB	<-90dB	<1.15	18 GHz	50 Ω	SMA	
44476B	Relay driver can support 2 microwave switches. Technical specs depend on the mounted relays.							

Module Connection Accessories

N2290A	Screw terminal block for N2260A, N2266A
N2291A	Screw terminal block for N2261A
N2292A	Screw terminal block for N2262A
N2293A	Screw terminal block for N2263A
N2294A	Screw terminal block for N2264A
N2295A	Screw terminal block for N2265A
N2297A	1.5 m cable for connecting DUT to N2260/1/3/4/5/6A, one DIN96-to-Twin-D50.
N2298A	1.5 m cable for connecting to DUT to N2262A, one DIN96-to-D25.
N2299A	1.5 m cable for connecting to N2260/1/3/4/5/6A, one DIN96-to-Quad D25.
N2327A	Crimp & Insert Connection kit for N2267A
N2320A	Crimp & Insert Connection kit for N2270A

Ordering Information

Agilent Technologies Products
Mainframes

3499A 5-Slot Switch/Control Mainframe, includes hard copy manual and power cord. Plug-in modules are ordered separately and are required for operation.

3499A-0B0 Delete Hard Copy User's Manual

3499A-1CP Rack Mount Kit with Handles

3499A-1CM Rack Mount Kit

3499A-0B1 Add additional User's Manual

3499B 2-Slot Switch/Control Mainframe, includes hard copy manual and power cord. Plug-in modules are ordered separately and are required for operation.

3499B-0B0 Delete Hard Copy User's Manual

3499B-1CM Rack Mount Kit with half-rack filler panel

3499B-0B1 Add additional User's Manual

3499C 9/14-Slot Switch/Control Mainframe. User's manual is not included. Must order 3499C-0B1 for hardcopy of the User's Manual.

Plug-in modules are ordered separately and are required for operation.

3499C-0B1 Hardcopy of User's Manual

For rackmount kit w/o handles, order the Agilent standard cabinet accessory 5063-9216

For rackmount kit with handles, order the Agilent standard cabinet accessory 5063-9223.

Mainframe Filler Panels

3499C-FP1 1-slot width filler panel for 3499A/B/C mainframes

3499C-FP2 2-slot width filler panel for 3499A/B/C mainframes

Plug-in modules, screw terminal blocks NOT included

N2260A 40-channel Multiplexer Module

N2261A 40-channel General Purpose Relay Module

N2262A 4 x 8 Matrix Module

N2263A 32-bit Digital I/O Module

N2264A 12 + 3 GP + 16-bit Digital I/O Module

N2265A 4 x 4 Matrix + 16-bit Digital I/O Module

N2266A 40-channel High-speed Multiplexer Module

N2267A 8-channel 8 A General Purpose Relay Module

N2268A Dual 1 x 4 RF (3.5 GHz) Multiplexer Module

N2270A 10-channel 1000 V Multiplexer Module

N2272A 1 x 9 RF (1GHz) Multiplexer Module

N2276A Dual 1 x 6 Microwave Multiplexer Module

N2276A-204 Dual 1 x 4 Multiplexer

N2276A-206 Dual 1 x 6 Multiplexer

N2276B Microwave Multiplexer Driver Module

N2280A Quad Optical 1 x 2 Multiplexer Module, SC/APC

N2281A Dual Optical 1 x 4 Multiplexer Module, SC/APC

N2282A 1 x 8 Optical Multiplexer Module, SC/APC

N2289A Mini-DIN-to-D9 cable for built-in DIO in 3499A/B

N2290A Screw terminal block for N2260A and N2266A

N2291A Screw terminal block for N2261A

N2292A Screw terminal block for N2262A

N2293A Screw terminal block for N2263A

N2294A Screw terminal block for N2264A

N2295A Screw terminal block for N2265A

N2297A DIN96-to-Twin-D50 cable for N2260-5A

N2298A DIN96-to-D25 cable for N2262A

N2299A DIN96-to-Quad-D25 cable for N2260-5A

N2320A Crimp & Insert Connection kit for N2270A

N2327A Crimp & Insert Connection kit for N2267A

Plug-in modules (Agilent 3488A family), screw terminal blocks included

44470A 10-channel Relay Multiplexer Module

44470D 20-channel Relay Multiplexer Module

44471A 10-channel GP Relay Module

44471D 20-channel GP Relay Module

44472A Dual 1 x 4 RF (300MHz) Multiplexer Module (50Ω)

44473A 4x4 Matrix Switch Module

44474A 16-bit Digital I/O Module

44475A Breadboard Module

44476A Microwave Multiplexer Module

44476B Microwave Switch Driver Module

44477A 7-channel Form-C Relay Module

44478A Dual 1x4 RF (1.3 GHz) Multiplexer (50Ω)

44478B Dual 1x4 RF (1.3 GHz) Multiplexer (75Ω)

44480A Connector Kit for 44470A

44480B Connector Kit for 44470D

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Agilent Technologies' Test and Measurement Support, Services, and Assistance
Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise
Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage
Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

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China:
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(fax) 800 820 2816

Europe:
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Japan:
(tel) (81) 426 56 7832
(fax) (81) 426 56 7840

Korea:
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(fax) (080)769 0900

Latin America:
(tel) (305) 269 7500

Taiwan:
(tel) 0800 047 866
(fax) 0800 286 331

Other Asia Pacific Countries:
(tel) (65) 6375 8100
(fax) (65) 6755 0042
Email: tm_ap@agilent.com

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